

# **2W-PL/IP-REPEATER**

**SA-PAM-RGN-xx-x xDSL TRANSMISSION SYSTEMS**

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## **USER MANUAL**

Version	1.1
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## VERSION CONTROL

User Manual Version	Date	Version of Firmware	Major changes to previous version
1.0	11.02.2005	1.6.6.26 1.6.S.2	Start Version TDM Start Version ATM
1.1	15.08.2005	1.6.6.26 1.6.S.4	None New T1 mode

### Warnings

INCORRECT USE OF THIS DEVICE, USE IN ANY OTHER ENVIRONMENT AND/OR CHASSIS/HOUSING THAN PROVIDED BY S-ACCESS MIGHT LEAD TO HARMFUL CONDITIONS. FAILURE TO FOLLOW THESE PRECAUTIONS MAY RESULT IN DEATH, SEVERE INJURY OR PROPERTY DAMAGE.

S-ACCESS GMBH REFUSES TO TAKE ANY RESPONSIBILITY; FURTHERMORE, NO WARRANTY IS GRANTED IN SUCH CASE!

Please read this manual carefully before operating the system.  
Installation of this equipment has to be done by qualified personnel only.

## 1 SELECTION GUIDE

Model	Type	2 wire	4 wire	Add Drop	Cross Connect	E1	T1	ATM	Nx64	VC12	Power Passthrough	Remotely powerable	Power source
SA-PAM-RGN-IP-E,V2	IP												
SA-PAM-RGN-IP-P,V2	IP												
SA-PAM-RGN-PL-E,V2	SAN												
SA-PAM-RGN-PL-P,V2	SAN												
SA-PAM-RGN-IP-E,V2n	IP												
SA-PAM-RGN-IP-P,V2n	IP												
SA-PAM-RGN-PL-E,V2n	SAN												
SA-PAM-RGN-PL-P,V2n	SAN												
SA-PAM-RGN-IP-E-ATM,V2	IP ATM												
SA-PAM-RGN-IP-P-ATM,V2	IP ATM												
SA-PAM-RGN-PL-E-ATM,V2	SAN ATM												
SA-PAM-RGN-PL-P-ATM,V2	SAN ATM												
SA-PAM-ADRE1-IP-E,V2	IP												
SA-PAM-ADRE1-IP-P,V2	IP												
SA-PAM-ADRE1-PL-E,V2	SAN												
SA-PAM-ADRE1-PL-P,V2	SAN												

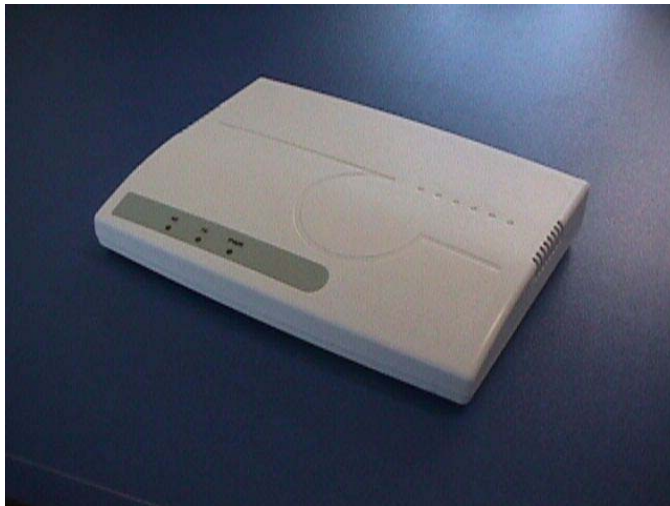
## 2 UNITS DESCRIPTION

The units are designed to be used as dual wire TDM or ATM repeater. They are available in a IP67 or plastic housing.

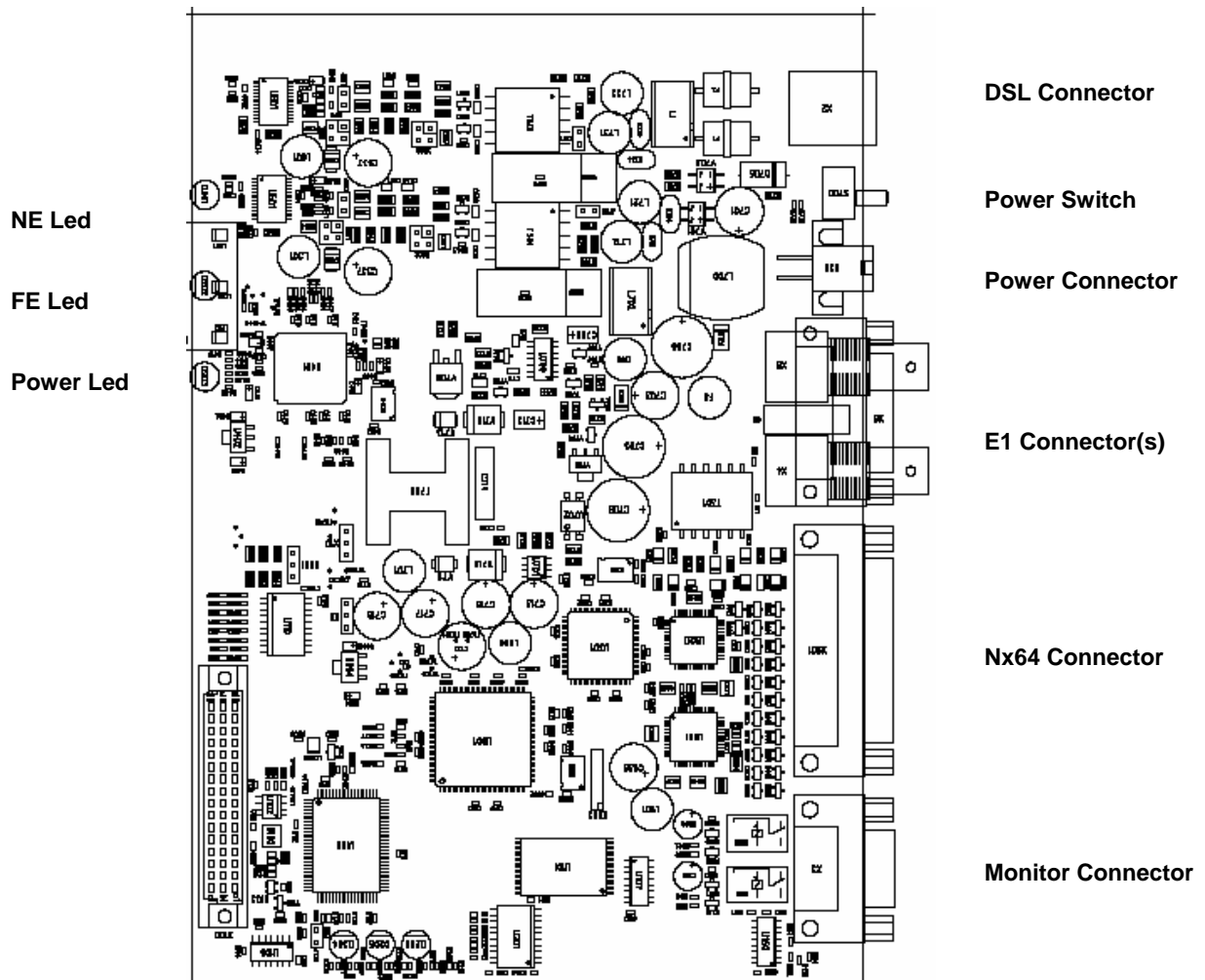
### 2.1 IP Housing



### 2.2 Plastic Housing



## 2.3 Connectors Mainboard





## 2.4 Jumper / Passthrough Resistor Description

<b>Nbr</b>	<b>Description</b>
J700	Wetting Current → use jumper to enable wetting current
J701	Wetting Current → use jumper to enable wetting current
R701	Passthrough Resistor 1 → 0R0 = Power passthrough enabled / nc = Passthrough disabled
R702	Passthrough Resistor 2 → 0R0 = Power passthrough enabled / nc = Passthrough disabled

## 3 CONFIGURATION / ACCESS

This chapter describes the different configuration access possibilities. The settings for the Repeater are configurable via the V.24 monitor interface or via the EOC Service Channel with the CONNECT xx command.

The following chapters refers to the xDSL configuration and does not impact the E1 behavior.

### 3.1 Repeater xDSL interfaces

xDSL Repeater has two xDSL interfaces: Network (N-side) xDSL interface (operates in slave mode) and Customer (C-side) xDSL interface (operates in master mode). N-side interface operates toward CO side while C-side transceiver works toward CP side. Are there one or more repeaters in the xDSL link, there C-side and N-side interfaces must be connected by appreciated method. Otherwise start-up might occur only for several segments of the link.

#### 3.1.1 N-side / C-side xDSL interface operating modes

N-side xDSL interface operates in rate adaptation mode or in fixerate mode. The C-side takes over the mode from the N-side

## 4 LED INDICATORS

Repeaters have two LED for power representation, link status- and test loop indication. The following table shows the possible LED states.

### 4.1 TDM regenerator

<b>Status</b>	<b>Local (NE) LED</b>	<b>Remote (FE) LED</b>	<b>Power (PWR) LED</b>
Power failure	off	off	off
DSL training N-side xDSL	red	don't care	red
DSL training C-side xDSL	don't care	red	red
LOOP2 initialized	amber	don't care	red
Normal operation of N-side xDSL	green	don't care	red
Normal operation of C-side xDSL	don't care	green	red

### 4.2 TDM ADRE1 repeater

<b>Status</b>	<b>Local (NE) LED</b>	<b>Remote (FE) LED</b>	<b>Power (PWR) LED</b>
Power failure	off	off	off
DSL training N-side xDSL	red	don't care	red
DSL training C-side xDSL	don't care	red	red
LOOP1 initialized	amber	don't care	red
LOOP2 initialized	amber	don't care	red
STARTAL initialized	amber	don't care	red
Normal operation of N-side xDSL	green	don't care	red
Normal operation of C-side xDSL	don't care	green	red

### 4.3 ATM regenerator

<b>Status</b>	<b>Local (NE) LED</b>	<b>Remote (FE) LED</b>	<b>Power (PWR) LED</b>
Power failure	off	off	off
DSL training N-side xDSL	red blinking	don't care	green
DSL training C-side xDSL	don't care	red blinking	green
LOOP2 initialized	amber	don't care	green
Normal operation of N-side xDSL	green	don't care	green
Normal operation of C-side xDSL	don't care	green	green

## 5 ALARMS

### 5.1 General Information

The alarms can be indicated by the following items:

- Led
- Software
- Alarm relays

### 5.2 Alarm Relays

The two alarm relays "Major" and "Minor", are available only on the ADRE1 models.

#### 5.2.1 Relay - Alarm Conditions

Major alarm:

- At least one of the NTU LEDs displays a red alarm
- Power failure of the NTUs

Minor alarm:

- At least one of the NTU LEDs displays an amber alarm and none red alarm
- Power failure of the LTUs

### 5.3 Alarm LEDs

#### 5.3.1 LED - Alarm Conditions

##### 5.3.1.1 Local (NE) LED

An alarm condition is displayed with the Local LED if one of the following conditions occurs:

Major alarm (red):

- Hardware or software failure (blinking)
- loss of signal / frame alignment on the xDSL side
- xDSL block-error-rate according G.826  $\geq 30\%$  (BER-H)
- E1 block-error-rate according G.826  $\geq 30\%$  (BER-S)
- Spectrum Transmission activated

Minor alarm (amber):

- loss of signal on the E1 side (LOS-S)
- loss of frame alignment on the E1 side (LFA-S)
- Segment defect alarm (SEGD)
- receiving AIS on E1 side (AIS-S)
- Loop 1 is activated
- Loop 2 is activated
- Analog Loopback is activated

Displaying a major alarm has a higher priority than displaying a minor one, i.e. an amber alarm will be "overwritten" by a red alarm.

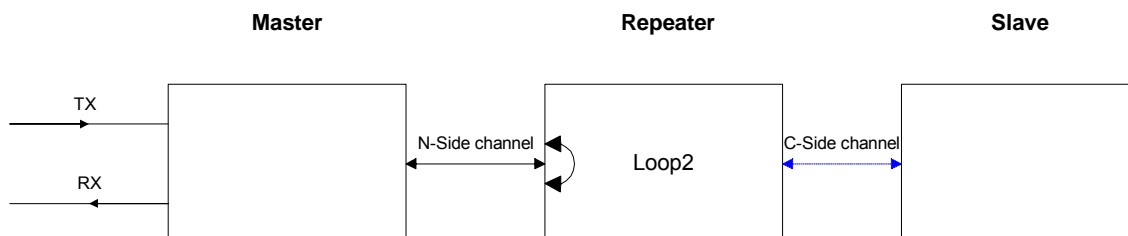
### 5.3.1.2 Remote (FE) LED

The remote LED is an image of the local LED of the remote station (see previous LED-table for exceptions).

## 6 TEST LOOPS

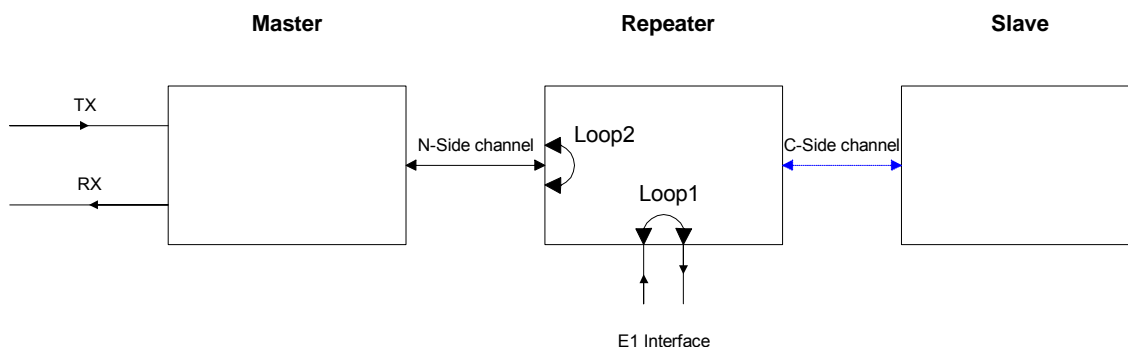
The test loop can be activated via the EOC service Channel interface or over the monitor interface. You will find the LOOP commands in the maintenance menu of the LTU.

### 6.1 Regenerator Test Loop



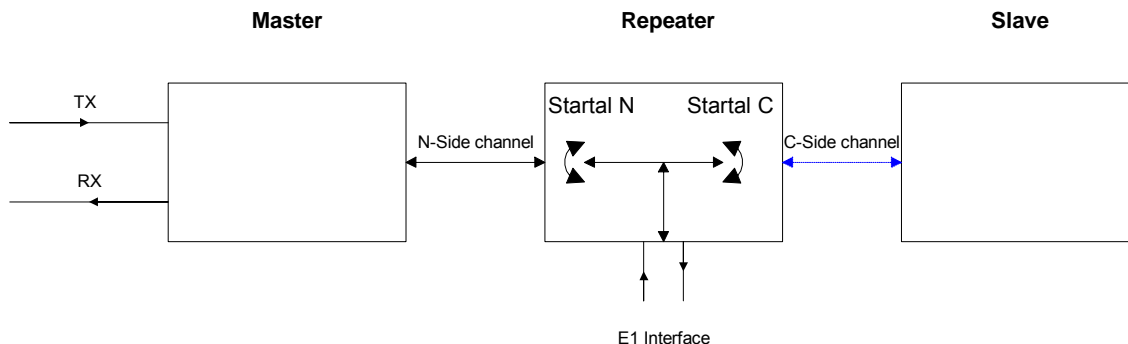
### 6.2 ADRE1 Repeater Test Loops

#### 6.2.1 Loop1 & Loop2



#### 6.2.2 Analog Loopback

Its possible to switch on / off an analog loopback seperatly on C- or N-side xDSL line.



## **7 PERFORMANCE MONITORING**

The monitoring of the xDSL signal is typically used during the installation and maintenance. Its possible to monitor the xDSL link in two different ways.

The G.826 error parameters are designed to observe xDSL links over longer time periods.

### **7.1 TDM repeaters**

The SQ is used to determine the S/N value before the DSL link becomes critical. Please refer to the “SQ” and “G826” monitor commands described in the “S-Access Monitor” section.

### **7.2 ATM repeaters**

The NM is used to determine the residual S/N value before the DSL link becomes critical. Please refer to the “NM” and “G826” monitor commands described in the “S-Access Monitor” section.

## 8 POWER

### 8.1 Power inputs

The unit can be fed over the following inputs:

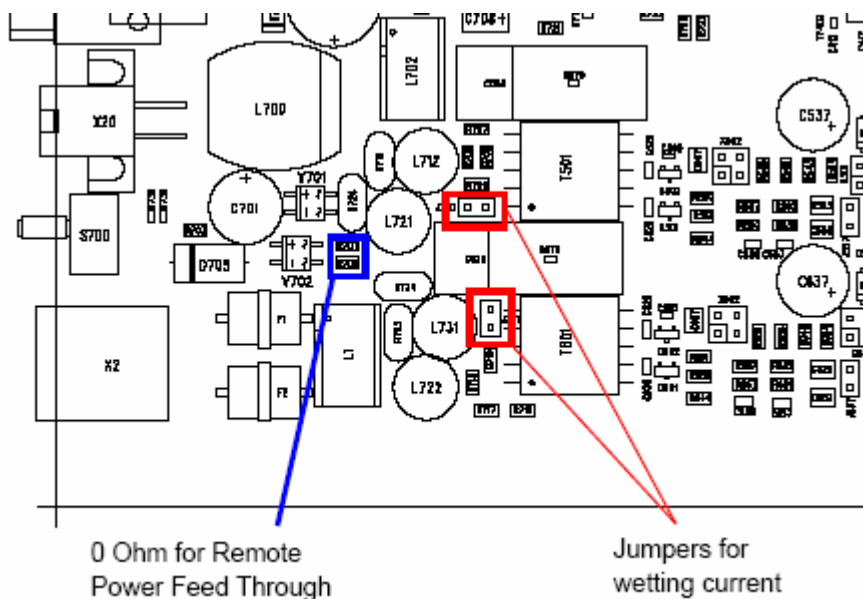
- Molex connector
- DSL line (remotely fed from the LTU)

### 8.2 Wetting current

The unit is able to handle the wetting current feature. Please use the “Jumper / Passthrough Resistor Description” table for the desired settings. In case of remote powering, the wetting current acceptance should be switched off (remove jumpers -see figure below).

### 8.3 Remote power passthrough

The unit is able to passthrough to remotely fed power to another repeater or to an NTU unit. Please use the “Jumper / Passthrough Resistor Description” table for the desired settings.



## 9 MONITOR

### 9.1 General

The module can be connected to a terminal or a PC (with terminal emulation) in order to monitor relevant events and to display additional information such as the signal quality of the xDSL link or the G.826 error performance parameters. In addition, full system configuration and fault localization can be done over the monitor interface

The terminal for monitoring should be VT100 compatible and configured as follows:

- 9600 baud, asynchronous
- 8 bits, no parity, one stop bit
- no new line on carriage return (i.e. no line feed on carriage return)
- flow control none

### 9.2 Structure & Organization

The structure and organization of the S-Access monitor is adapted to ITU-T Recommendation M.3400 for TMNs with its five sub-sets.

Sub-set	Short-form
Performance management	PM
Fault and maintenance management	FMM
Configuration management	CM
Accounting management	AM
Security management	SM

As S-Access does not support Accounting management nor Security management, AM and SM are not in the monitor's main menu.

At any time, the <H> ("Help") command shows and explains the available commands and their parameters.

For details or a more precise explanation of a command type: H '*command*'

The prompt on the screen consists of:

- a repeater indication (RR\_)
- the repeater address indication
- the shortform of the specified sub-set menu.

For example: "RR\_04\_FMM>".

Note: Repeater address is calculated as repeater position (starting from CO side) in the xDSL chain plus 2. Thus the repeater nearest to CO side has address 03, second one – 04, etc.

The following rules are valid for the manual:

- N stays for "network side" (near end)
- C stays for "customer side" (far end)



### 9.3 Repeater command tree

The repeater command set tree is shown below. Please note: Other commands listed in the Help menus will not work.

#### 9.3.1 TDM regenerator

Main Menu		
Performance	Fault and Maintenance	Configuration
G826	SQ	CONFIG
G826 C	STARTUP	AUTORESTART
RESETG826	STATUS	BASERATE
	ALARM	ANNEX
	ALARM T	ADAPTIVE
	LOOP2	SCALE
	STARTAL	DEFAULT
	RESTART	ID
	SPECTRUM	
	RESET	

Figure 9-1: TDM RGN Monitor Command Set Tree

#### 9.3.2 TDM ADRE1 repeater

Main Menu		
Performance	Fault and Maintenance	Configuration
G826	SQ	CONFIG
G826 C	STARTUP	PCM
G826 E1	STATUS	PAYLOAD
G826 E1 C	ALARM	IDLECAS
RESETG826	ALARM T	TS0SRC
	LOOP1	AUTORESTART
	LOOP2	BASERATE
	STARTAL	ANNEX
	RESTART	ADAPTIVE
	SPECTRUM	DEFAULT
	RESET	SCALE
		ID

Figure 9-2: TDM ADRE1 Monitor Command Set Tree

### 9.3.3 ATM regenerator

Main Menu		
Performance	Fault and Maintenance	Configuration
G826	NM	CONFIG
G826 C	STATUS	MODE
RESETG826	ALARM	ANNEX
	ALARM T	BASERATE
	RESET	ADAPTIVE
		SCALE
		DEFAULT
		ID

Figure 9-3: ATM RGN Monitor Command Set Tree

### 9.3.4 Main Menu

S-Access Simple Repeater

HW Rev. B1  
SW Rev. 1.6.6.26  
FW Rev. R1.7

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----- Main Menu -----

1. Performance management (PM)
2. Fault and maintenance management (FMM)
3. Configuration management (CM)

5. Exit

RR\_03\_MM>Select [1..5]:

To select the sub-menus type 1 to 5.

Note: Each command must be terminated by a carriage return.

### 9.3.5 Common Commands

Common commands are available in every sub menu.

#### 9.3.5.1 HELP Command

By typing the letter "H" followed by [ENTER], all available commands of the actual sub menu are displayed.

#### 9.3.5.2 MAIN Command

By typing the letter "M" followed by [ENTER], you return to the Main Menu Screen.

### 9.3.6 Performance management PM

Performance management activated  
Enter <M> to return to MAIN, or <H> for HELP information

Type <H> and the monitor lists all available commands in the performance sub-menu.

#### 9.3.6.1 G826 Command

The G826 command displays the ITU-T G.826 error performance on xDSL line side:

```
-----
G.826 Error Performance :   CRC6-A   FEBE-A   CRC6-B   FEBE-B
-----
Errored blocks          : 00000000 00000000 00000000 00000000
Errored seconds         : 00000000 00000000 00000000 00000000
Severely errored seconds : 00000000 00000000 00000000 00000000
Background block errors : 00000000 00000000 00000000 00000000
Available time          : 00000000 00000000 00000000 00000000
Unavailable time        : 00000382 00000382 00000382 00000382
-----
RR_00_PM>
```

#### Option:

C      Updates the G.826 parameters continuously

#### Definitions:

1. CRC6\_x:                      Cyclic redundancy check indicating errored blocks received on the local xDSL side.
2. FEBE\_x:                     Far end block error indicating errored blocks received on the remote xDSL side.
3. Errored blocks (EB):        A block in which one or more bits are in error.
4. Errored seconds (ES):       A one second period with one or more errored blocks. SES defined below is a subset of ES.
5. Severely errored second (SES): A one second period which contains  $\geq 30\%$  errored blocks.
6. Background block error (BBE): An errored block not occurring as part of an SES.

### 9.3.6.2 G826 E1 Command

The G826 E1 command displays the ITU-T G.826 error performance parameters on the E1 2Mbit/s side. This command is only available if framed mode is enabled.

```

-----
G.826 Error Performance :      CRC4      E-Bit
-----
Errored blocks          : 00000000 00000000
Errored seconds         : 00000000 00000000
Severely errored seconds : 00000000 00000000
Background block errors : 00000000 00000000
Available time          : 00000000 00000000
Unavailable time        : 00000100 00000100
-----
RR_03_PM>

```

#### Option:

C      Updates the G.826 E1 parameters continuously

#### Definitions:

1. CRC4: Cyclic redundancy check indicating errored sub-multiframes received on the local 2Mbit/s E1 side.
2. E-bit: CRC-4 indication bit indicating received errored sub-multiframes on the 2Mbit/s E1 remote side.

### 9.3.6.3 RESETG826 Command

The RESETG826 command sets the G.826 error performance parameters back to zero.

```

RR_00_PM>RESETG826
G.826 error performance parameter reset
RR_00_PM>

```

### 9.3.7 Fault and maintenance management FMM

Fault and maintenance management activated  
Enter <M> to return to MAIN, or <H> for HELP information

Type <H> and the monitor lists all available commands in the fault and maintenance sub-menu.

#### 9.3.7.1 SQ Command

The SQ command allows the user to switch on/off the signal quality trace of the DSL lines:

```
RR_03_FMM>SQ
Signal quality trace on
xDSL SNR: N-Side 38.3 dB, C-Side 38.8 dB
xDSL SNR: N-Side 38.1 dB, C-Side 37.7 dB
xDSL SNR: N-Side 37.5 dB, C-Side 39.0 dB
xDSL SNR: N-Side 37.5 dB, C-Side 37.8 dB
xDSL SNR: N-Side 37.7 dB, C-Side 38.8 dB
xDSL SNR: N-Side 37.4 dB, C-Side 38.0 dB
RR_03_FMM>SQ
Signal quality trace off
RR_03_FMM>
```

#### 9.3.7.2 NM Command

The NM command allows the user to switch on/off the signal quality trace of the DSL lines:

```
RR_00_FMM>NM
Noise margin trace on
xDSL NM: Mst-Side ChA: 10.9dB, ChB: 11.2dB   Slv-Side ChA: 15.8dB, ChB: 15.4dB

Noise margin trace off
RR_00_FMM>
```

#### 9.3.7.3 STARTUP Command

The STARTUP command allows the user to toggle the startup trace on and off, in order to observe the LTU / NTU activation state diagram transitions conforming to ITU-T G.991.2.

```
RR_00_FMM>STARTUP
xDSL transceiver startup trace on
N:No Activity
C:No Activity
.
.
.
C:No Activity
N:Load cptom
N:Receive Tc
N:Load cpdm
N:No Activity
RR_00_FMM>
```

### 9.3.7.4 STATUS Command

The STATUS command displays the actual system status:

```
RR_03_FMM>STATUS
```

```
-----
Local System Status N/C Side
-----
```

```

LOSD      :      1      1
SEGA      :      1      1
PS        :      1      1
SEGD      :      1      1
Tx power  :  07.5  07.5 dBm
Rx gain   :  09.7  09.5 dB
Loop attn.:  00.0  00.0 dB
Bitrate   :  2056  2056 kbit/s
ANNEX     :      A      A
SCALE     :  13.5   13.5   dB
-----
```

```
RR_03_FMM>
```

#### Definitions:

LOSD: (Loss of Signal) Indicates the loss of signal from the application interface. Loss of Signal = 0, Normal = 1.

SEGA: (Segment Anomaly) Indicates a CRC error on the incoming xDSL frame. A segment anomaly indicates that a regenerator operating on a segment has received corrupted data and therefore the regenerated data is unreliable. CRC Error = 0, Normal = 1.

PS: (Power Status)

SEGD: (Segment Defect)

Tx power: Local transmit power in dBm

Rx gain: Local receiver gain in dB

Loop attn.: Estimation of the loop attenuation in dB of the actual connection

Annex Shows the actual Annex

Bitrate: Bitrate of the actual connection

Scale Shows the actual power training start value

### 9.3.7.5 ALARM Command

The ALARM command displays the actual alarm status:

```
RR_03_FMM>ALARM
```

```
-----
Local Alarm Status N/C Side
-----
```

```
LOS-S      : ---
LFA-S      : ---
AIS-S      : ---
BER-S      : ---
LOS/LFA-H: off  off
SEGD       : off  off
BER-H      : off  off
LOOP1      : ---
LOOP2      : off
ALB        : off  off
TEST       : off  off
-----
```

```
RR_03_FMM>
```

#### Options:

T       Turns alarm trace on / off

#### Definitions:

LOS-S:	Loss of signal at subscriber (E1) side
LFA-S:	Loss of frame alignment at subscriber (E1) side
AIS-S:	AIS (Alarm Indication Signal) detected at subscriber (E1) side
AIS-R:	AIS (Alarm Indication Signal) detected at subscriber (E1) side of remote unit
BER-S:	Excessive Block Error Rate on subscriber side If CRC4 enabled : BER-S = on if more than 805 CRC4 Errors per second. If CRC4 disabled : BER-S = on if more than 28 FAS Errors per second.
ETC-LOS:	V.35/V.36/X.21: Loss of external timing reference
LOS/LFA-H:	Loss of signal or frame alignment at xDSL loop
SEGD:	Segment Defect indication
BER-H:	xDSL block-error-rate according G.826 $\geq 30\%$
LOOP1:	xDSL test loop 1 active (see section)
LOOP2:	xDSL test loop 2 active
ALB:	Analog loopback
TEST:	At least one test function is active

### 9.3.7.6 LOOP1 Command

The LOOP1 command starts the E1 local loopback (see section Test Loops):

```
RR_03_FMM>LOOP1 ON
Loop 1 on
RR_03_FMM>
```

```
RR_03_FMM>LOOP1 OFF
Loop 1 off
RR_03_FMM>
```

### 9.3.7.7 LOOP2 Command

The LOOP2 command starts the remote loopback (see section Test Loops):

```
RR_03_FMM>LOOP2 ON
Local loop N-side started
RR_03_FMM>
```

```
RR_03_FMM>LOOP2 OFF
Local loop N-side stopped
RR_03_FMM>
```

### 9.3.7.8 STARTAL Command

The STARTAL command starts the analog loopback.

```
RR_03_FMM>STARTAL N
Analog loopback started
RR_03_FMM>
```

```
RR_03_FMM>STARTAL N
Analog loopback stopped
RR_03_FMM>
```

### 9.3.7.9 RESTART Command

The RESTART command restarts the selected DSL channel.

```
RR_03_FMM>RESTART N
Restarting network channel
RR_03_FMM>
```



#### 9.3.7.10 Spectrum Command

The SPECTRUM command switches on/off the xDSL analog output for power measurements.

```
RR_03_FMM>SPECTRUM N
Analog spectrum started
RR_03_FMM>SPECTRUM N
Analog spectrum stopped
RR_03_FMM>
```

#### 9.3.7.11 RESET Command

By typing RESET, the system unit will be restarted.

```
RR_03_FMM>RESET

System reset
```

### 9.3.8 Configuration management CM

Configuration management activated

Enter <M> to return to MAIN, or <H> for HELP information

Type <H> and the monitor lists all available commands in the configuration sub-menu.

#### 9.3.8.1 CONFIG Command

The CONFIG command displays the configuration of the unit.

Note: After each configuration change, the new configuration is automatically displayed.

#### 9.3.8.2 ADAPTIVE Command

Set rate adaption on / off

#### 9.3.8.3 ANNEX Command

This command sets the Annex to the desired mode.

Parameters: A → Annex A  
B → Annex B  
AB → Autoselection

#### 9.3.8.4 AUTORESTART Command

Set autorestart on / off

Parameters: on  
off

#### 9.3.8.5 BASERATE Command

This command sets the base rate for xDSL interface. It defines the available 64 kbit/s channels. To optimize the bandwidth of your connection, you have to set the base rate value to the maximum where you get a stable connection.

Parameters: 3 → 32 (36 for ATM regenerators)

#### 9.3.8.6 DEFAULT Command

The DEFAULT command sets a default configuration.

Parameters: 0  
1  
2

#### 9.3.8.7 DEFAULT Command (ATM version)

The DEFAULT command sets a default configuration.

Parameters: E → E1,TDM  
T → T1,TDM  
A → ATM  
N → Nx64  
V → VC12

#### 9.3.8.8 MODE Command

This command sets the G.SHDSL operation mode.

Parameters: E → E1,TDM  
T → T1,TDM  
A → ATM  
N → Nx64  
V → VC12

#### 9.3.8.9 ID Command

This command sets a unique identification string printed on the main screen.

Parameters: max. 20 chars

#### 9.3.8.10 IDLECAS Command

This command sets the idle pattern for TS16.

Parameters: 1 ... F (hex)

#### 9.3.8.11 PAYLOAD Command

This command sets the numbers of channel timeslots to be transmitted to xDSL interfaces A (DSL far) and B (E1 interface).

Parameters: 0...31

#### 9.3.8.12 PCM Command

This command enables/disables timeslot 16 processing:

Parameters: 30 → Set timeslot 16 processing on  
31 → Set timeslot 16 processing off

#### 9.3.8.13 SCALE Command

This command defines the startup power offset value of the DSL line to a reference output power of 13.5dBm.

**Please note:** *This command should be used from qualified personal only. Wrong parameter values can force none working DSL links.*

Parameters: -16.0 → 2.0 in 0.5dB steps (0.0dB → DEFAULT Value)

## 10 SOFTWARE UPDATE

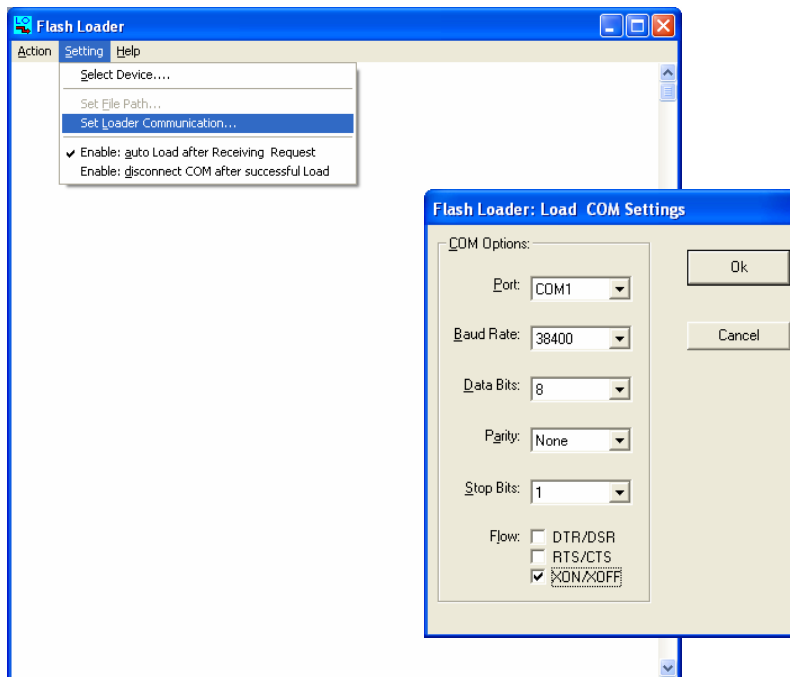
### 10.1 General

The software of the S-Access boards has the possibility for field updates. To do a field update, you need only a Windows 95/98/NT computer, the *Flash Loader* program installed, a connection between the Windows computer and the repeater Monitor connector and the newest release of the S-Access software.

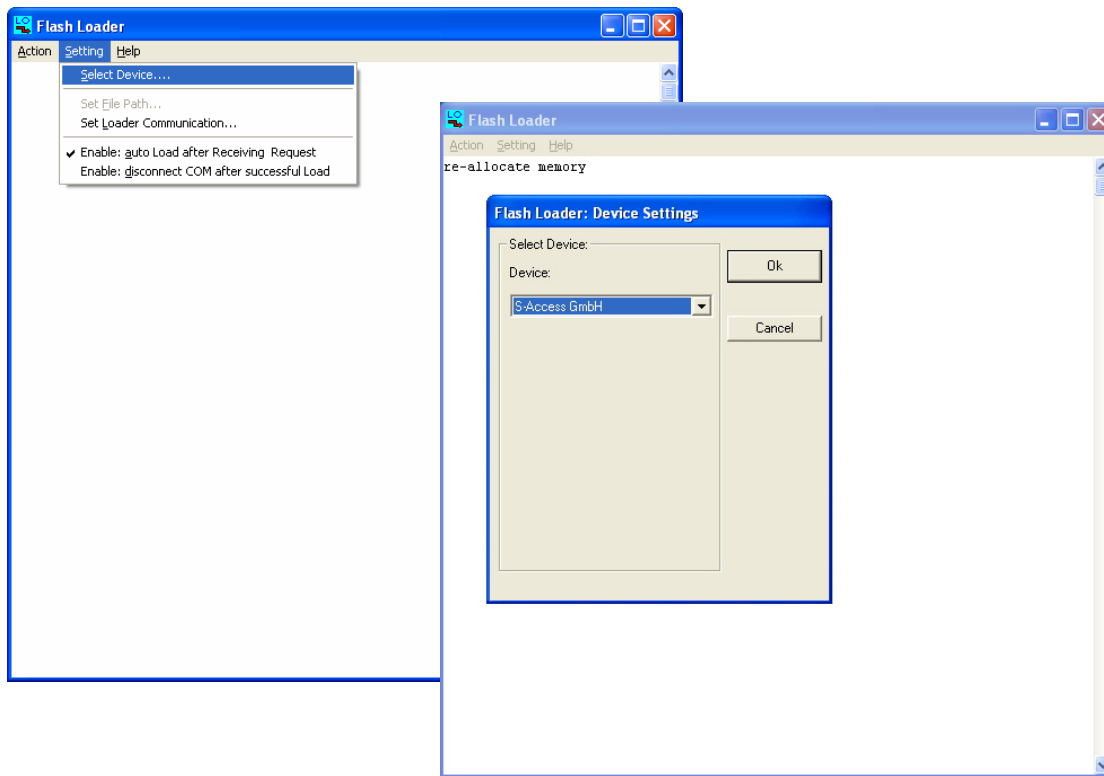
### 10.2 Software download

To update the software on your repeater you have to run through the following steps:

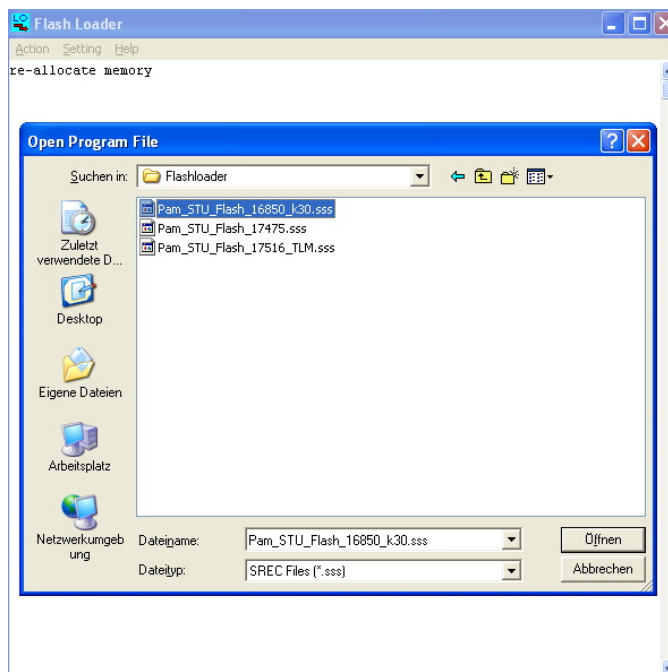
1. Switch off the power of your repeater.
2. Connect the repeater monitor connector with your Windows computer's RS232 interface.
3. Start the *Flash Loader* software on your Windows computer
4. Choose *Set Loader Communication* in the menu *Setting*. Select the right communication port, the communication information and press *Ok*.



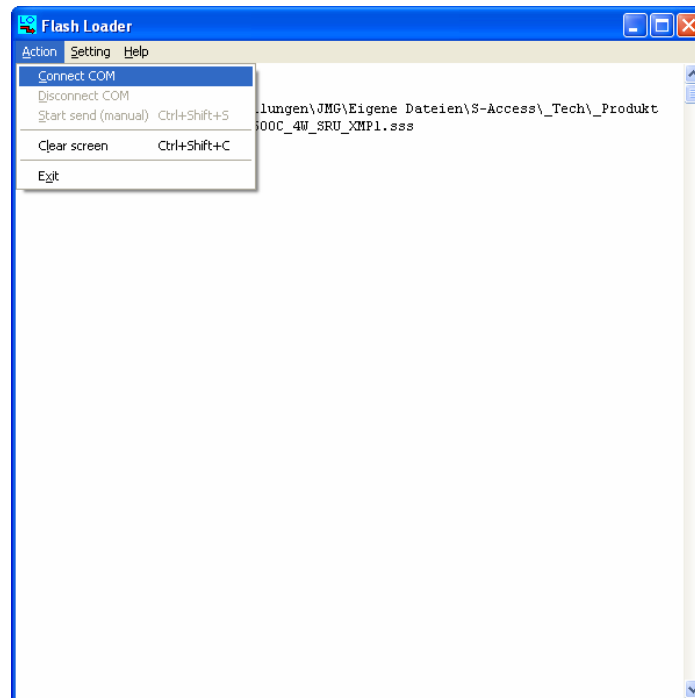
5. Choose *Select Device* in the *Setting* menu, select the device *S-Access* and press *Ok*.



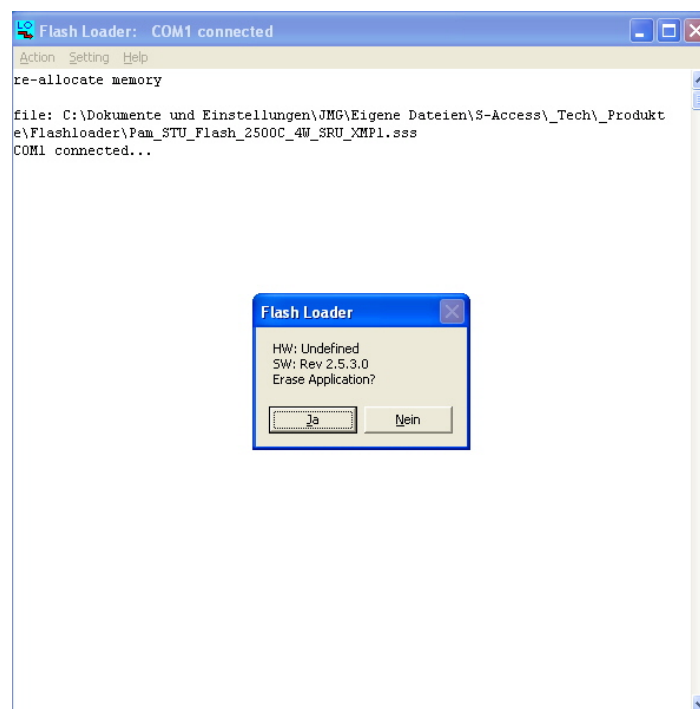
6. Choose the newest software version and press *Öffnen*.



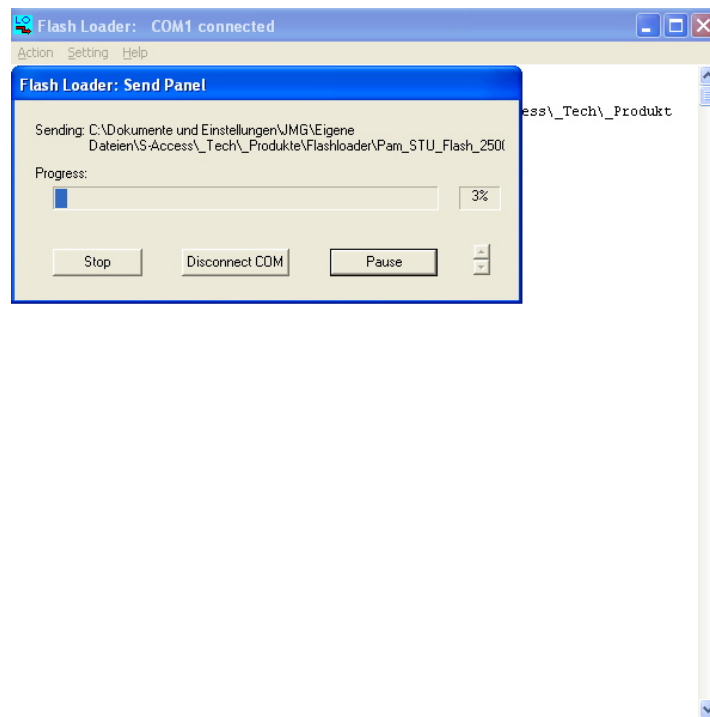
7. Execute the command *Connect COM* in the menu *Action*.



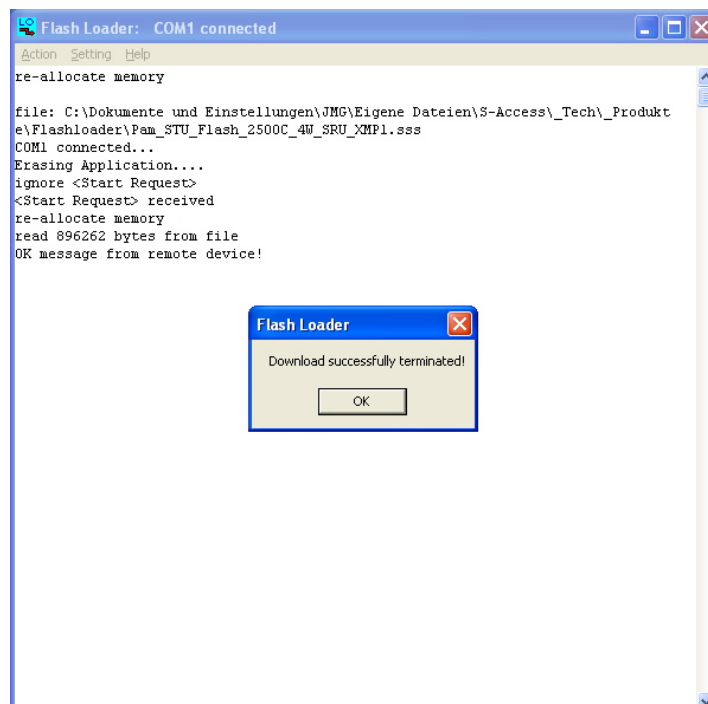
8. Switch on the power of your repeater.  
9. The following message appears on the screen, then press *Ja*.



10. During the download the FE-LED is green blinking and the NE-LED is amber. On the Windows screen you see the ongoing download.



11. If the download is successfully finished the *Flash Loader* program sends the following message:



12. If the download was successful, the LTU/NTU restarts automatically.

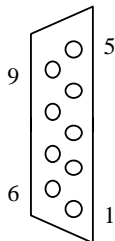
## 11 CONNECTOR DESCRIPTION

### 11.1 xDSL Interface

Uninet CABLE  
7002 4P  
800Mhz

	Signal	Description
	Loop IN Tip	N-Side (Slave): Green Wire
	Loop IN Ring	N-Side (Slave): White-Green Wire
	Loop OUT Tip	C-Side (Master): Orange Wire
	Loop OUT Ring	C-Side (Master): White-Orange Wire
	NC	Not used
	NC	Not used
	NC	Not used
	NC	Not used

### 11.2 Monitor Interface



Pin	Signal	Description
1	FPE	Functional Protective Earth
2	TXD	EIA-232 Transmit Data
3	RXD	EIA-232 Receive Data
4	NC	Not used
5	SGND	EIA-232 Signal Ground
6	NC	Not used
7	NC	Not used
8	NC	Not used
9	NC	Not used

- on NTU only

### 11.3 Power Interface

#### 11.3.1 Cable

Grey Power Cable  
Input 38 – 200 VDC

Pin	Signal	Description
	-MainsPWR	White
	+PWR	Green
	NC	Not used
	NC	Not used



## Technical Specification

**11.4 Interfaces****11.4.1 xDSL Line Interface**

Specification	ITU-T G.SHDSL, Rec G.991.2
Option	2-wire Interface
Line Code	TC-PAM
Impedance	135 $\Omega$
Transmit Power	13.5 dBm @ 135 $\Omega$
Number of Pairs	1
Bit Rate	192 to 2064 kbps
Connector Type	RJ-45, 8 pin
Overvoltage Protection	ITU-T Rec. K.20/K.21
Specification	ITU-T G.SHDSL, Rec G.991.2
Wetting Current	2-4 mA @ 60 V

**11.4.2 Monitor Interface**

Specification	EIA-232 / V.28
Data Rate	9600 baud, asynchronous
Protocol	8 bit, no parity, 1 stop bit no linefeed with carriage return XON/XOFF enabled
Signal Level	V.28 on DB9 female connector
Connector Type	DB9 female connector

**11.5 Power Supply**

Specification	ETSI ETS 300 132-2
Tabletop	1 x 48Vdc (36-72V DC) over Molex type safety approved connector or 38..200Vdc over xDSL
Power Consumption	Typ 3.0W      SA-PAM-RGN-xxx Typ 4.1W      SA-PAM-ADRE1-xxx

**11.6 Environmental****11.6.1 Climatic Conditions**

Storage:	ETS 300 019-1-1 Class 1.2	(-25°C ... +55°C)
Transportation:	ETS 300 019-1-2 Class 2.3	(-40°C ... +70°C)
Operation:	ETS 300 019-1-3 Class 3.2	(-5°C ... +45°C)

**11.6.2 Safety / EMC**

According to EN60950 / EN 55022 , Class B

## 11.7 Physical Dimensions and Weight

IP:                      Dimensions: 300(W)x166(D)x65(H) mm  
                             Weight: 2.5 kg

Plastic:                Dimensions: 230(W)x160(D)x46(H) mm  
                             Weight: 0.7 kg

## 12 APPENDICES

### 12.1 Initialization Errors

At system startup, various hardware selftests are performed. If any initialization error occurs, the startup procedure will be aborted and the monitor will display an initialization error code in hexadecimal representation. Each bit of the word value corresponds to a specific initialization error and is set to one if the corresponding hardware is faulty. The table below lists the possible initialization errors and their corresponding bit position in the error code word.

Bit Nr	Initialization Error
0	Microcontroller RAM test failure
1	

### 12.2 Standards

ETSI ETR 152, "Transmission and Multiplexing (TM); High Bit Rate Digital Subscriber Line (xDSL) Transmission System on Metallic Local Lines; xDSL Core Specification and Applications for 2048 kbit/s Based Access Digital Sections"

ITU-T G.821, "Error Performance of an International Digital Connection Forming Part of an Integrated Services Digital Network"

ITU-T G.826, "Error Performance Parameters and Objectives for International, Constant Bit Rate Digital Paths at or above the Primary Rate"

ITU-T G.823, "The Control of Jitter and Wander within Digital Networks Which Are Based on the 2048 kbit/s Hierarchy"

ITU-T G.703, "Physical/Electrical Characteristics of Hierarchical Digital Interfaces"

ITU-T G.704, "Synchronous Frame Structures Used at Primary and Secondary Hierarchical Levels"

ITU-T M.3400, "TMN Management Functions"

ITU-T K.20, "Resistibility of Telecommunication Switching Equipment to Overvoltages and Overcurrents"

ITU-T K.21, "Resistibility of Subscribers' Terminals to Overvoltages and Overcurrents"

EN 60950, "Safety of Information Technology Equipment Including Electrical Business Equipment"

EN 55022, "Grenzwerte und Messverfahren für Funkstörungen von informationstechnischen Einrichtungen"

ETS 300 019, "Equipment Engineering; Environmental Conditions and Environmental Tests for Telecommunications Equipment"